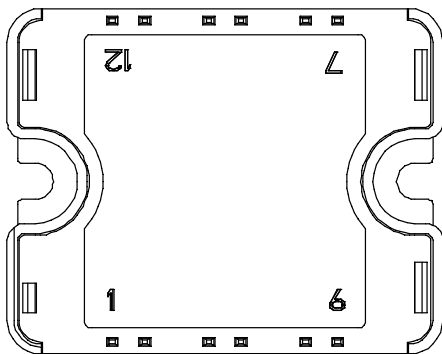
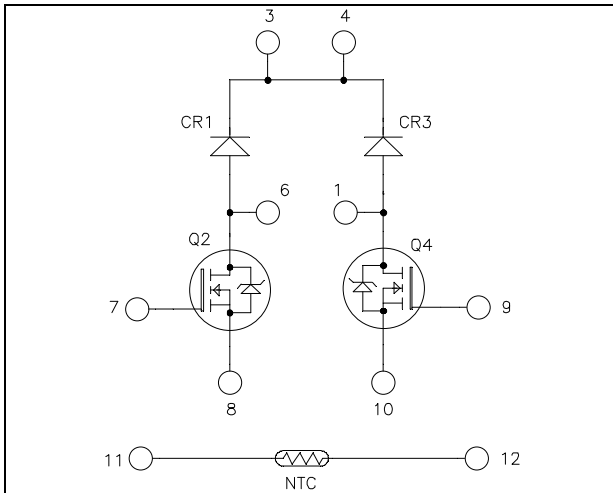


**Dual boost chopper  
Super Junction MOSFET  
Power Module**

$V_{DSS} = 600V$   
 $R_{DSon} = 45m\Omega \text{ max @ } T_j = 25^\circ C$   
 $I_D = 49A \text{ @ } T_c = 25^\circ C$



Pins 3/4 must be shorted together

### Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

### Features

• **COOLMOS**  
Power Semiconductors

- Ultra low  $R_{DSon}$
  - Low Miller capacitance
  - Ultra low gate charge
  - Avalanche energy rated
  - Very rugged
- Very low stray inductance
    - Symmetrical design
  - Internal thermistor for temperature monitoring
  - High level of integration
- ### Benefits
- Outstanding performance at high frequency operation
  - Direct mounting to heatsink (isolated package)
  - Low junction to case thermal resistance
  - Solderable terminals both for power and signal for easy PCB mounting
  - Each leg can be easily paralleled to achieve a single boost of twice the current capability
  - Low profile
  - RoHS Compliant

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	600	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	49
		$T_c = 80^\circ C$	38
$I_{DM}$	Pulsed Drain current	130	A
$V_{GS}$	Gate - Source Voltage	$\pm 20$	V
$R_{DSon}$	Drain - Source ON Resistance	45	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	250
$I_{AR}$	Avalanche current (repetitive and non repetitive)	15	A
$E_{AR}$	Repetitive Avalanche Energy	3	mJ
$E_{AS}$	Single Pulse Avalanche Energy	1900	

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

All ratings @  $T_j = 25^\circ\text{C}$  unless otherwise specified

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 600V$			250	$\mu\text{A}$
		$T_j = 25^\circ\text{C}$				
		$V_{GS} = 0V, V_{DS} = 600V$			500	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 24.5A$		40	45	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 3\text{mA}$	2.1	3	3.9	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$			100	$\text{nA}$

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V ; V_{DS} = 25V$ $f = 1\text{MHz}$		7.2		nF
$C_{oss}$	Output Capacitance			8.5		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 300V$ $I_D = 49A$		150		nC
$Q_{gs}$	Gate – Source Charge			34		
$Q_{gd}$	Gate – Drain Charge			51		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive Switching (<math>125^\circ\text{C}</math>)</b> $V_{GS} = 10V$ $V_{Bus} = 400V$ $I_D = 49A$ $R_G = 5\Omega$		21		ns
$T_r$	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			100		
$T_f$	Fall Time			45		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 10V ; V_{Bus} = 400V$ $I_D = 49A ; R_G = 5\Omega$		675		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			520		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 10V ; V_{Bus} = 400V$ $I_D = 49A ; R_G = 5\Omega$		1100		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			635		

**Chopper diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600V$	$T_j = 25^\circ\text{C}$		25	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		500	
$I_F$	DC Forward Current			60		A
$V_F$	Diode Forward Voltage	$I_F = 60A$		1.7	2.3	V
		$I_F = 120A$		2		
		$I_F = 60A$	$T_j = 125^\circ\text{C}$	1.4		
$t_{rr}$	Reverse Recovery Time	$I_F = 60A$ $V_R = 400V$ $di/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	70		ns
			$T_j = 125^\circ\text{C}$	140		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 60A$ $V_R = 400V$ $di/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	100		nC
			$T_j = 125^\circ\text{C}$	690		

**Thermal and package characteristics**

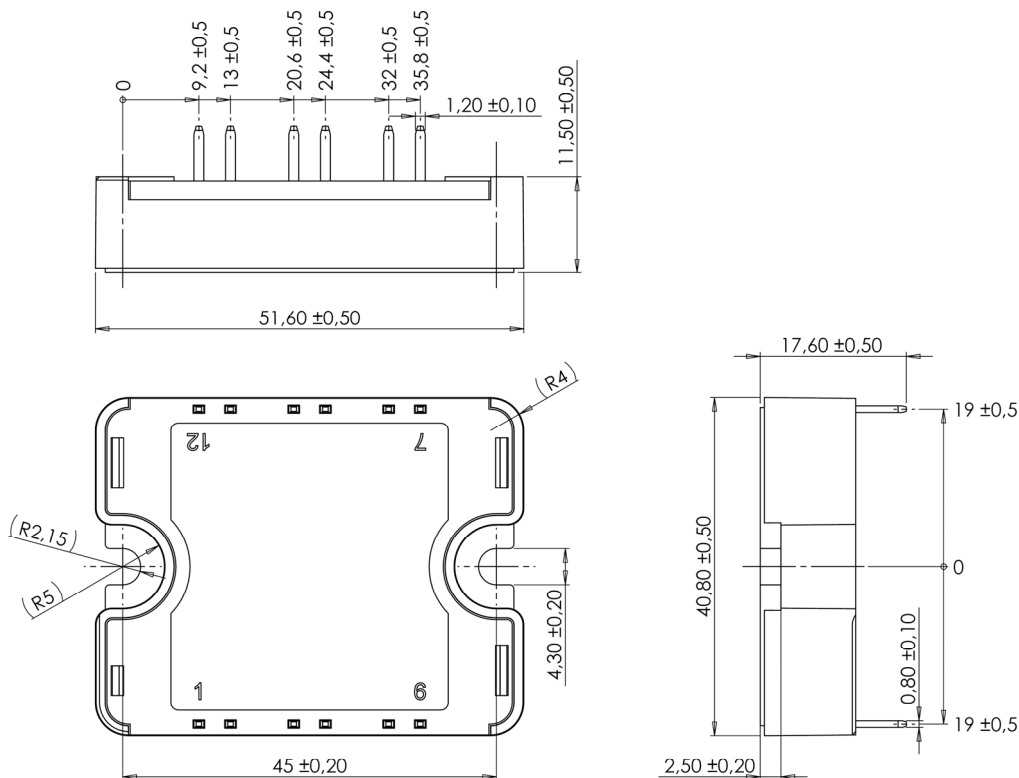
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	CoolMOS		0.5	°C/W	
		Diode		0.85		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				80	g

**Temperature sensor NTC** (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
ΔR <sub>25</sub> /R <sub>25</sub>			5		%
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K
ΔB/B	T <sub>C</sub> = 100°C		4		%

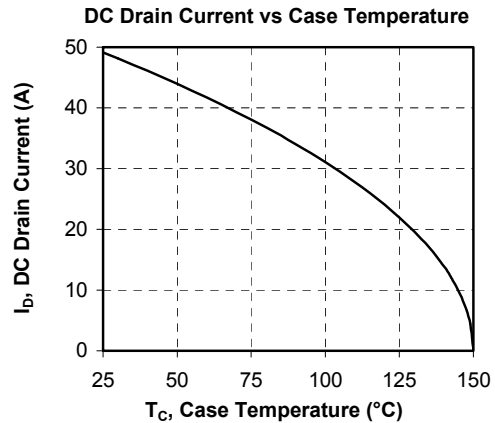
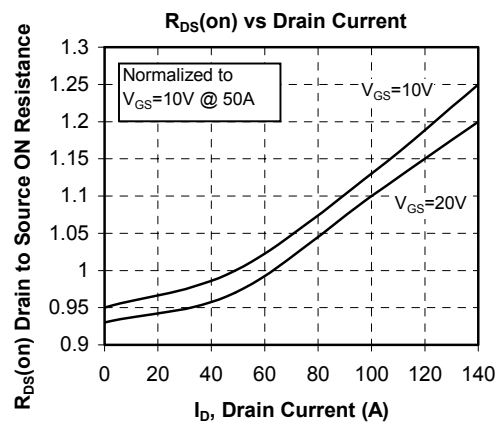
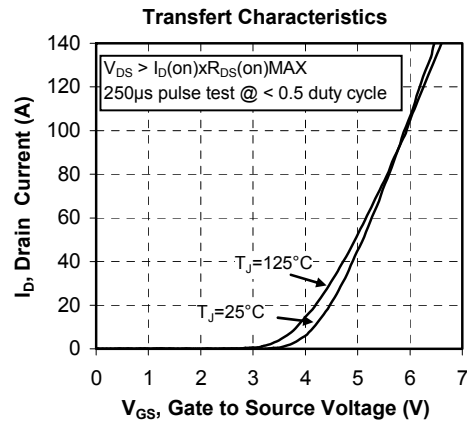
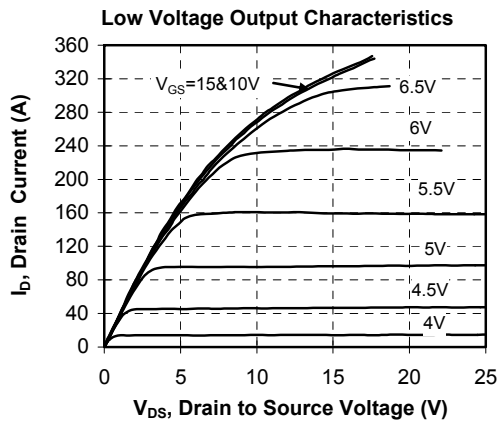
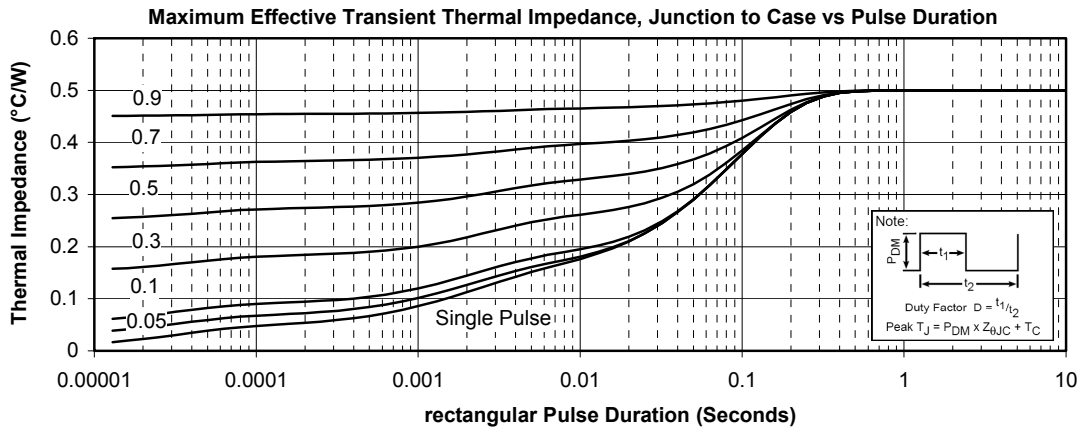
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

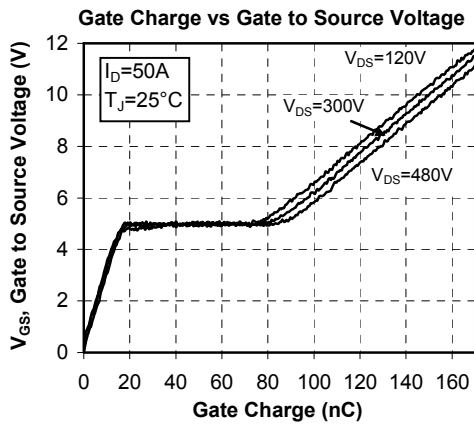
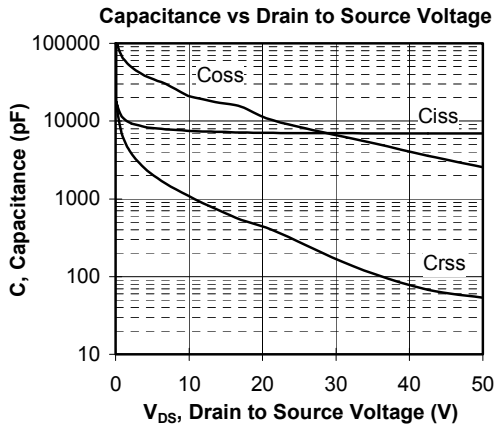
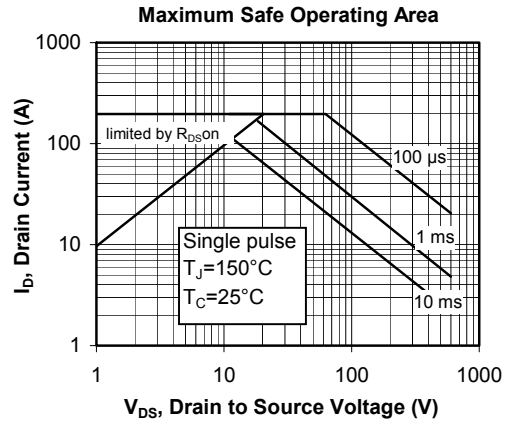
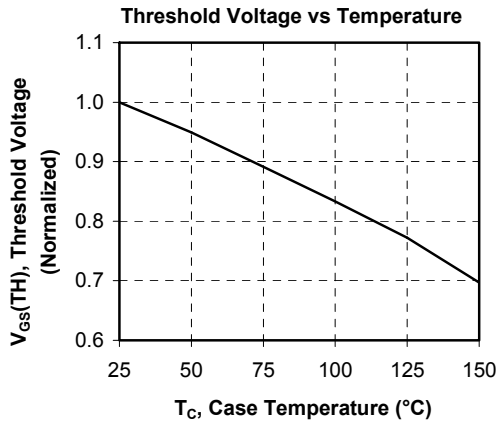
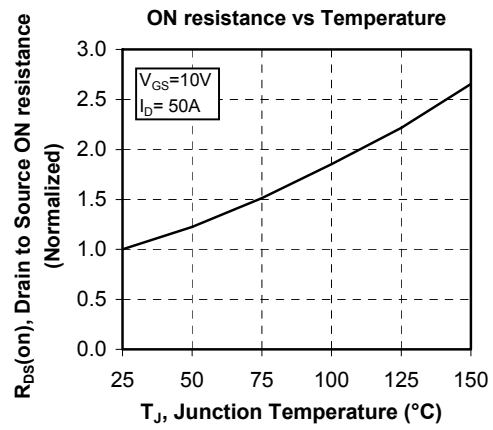
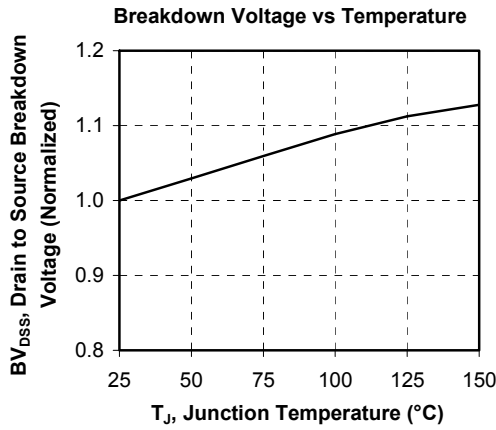
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

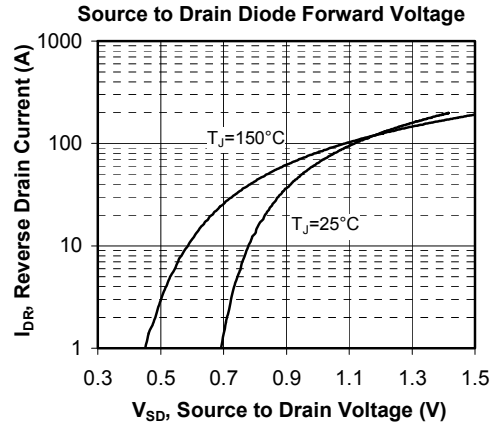
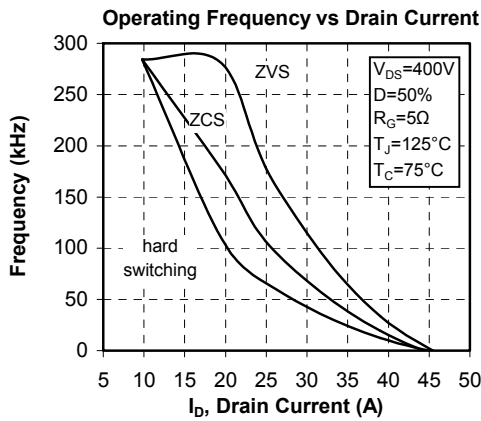
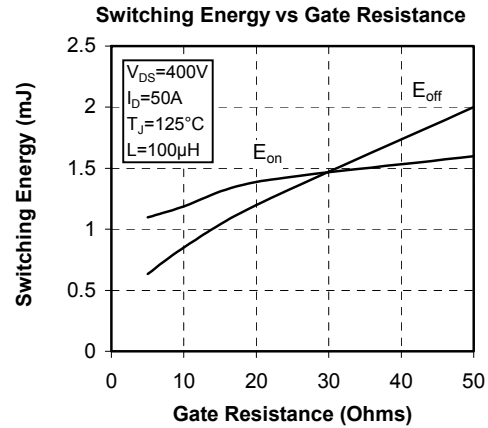
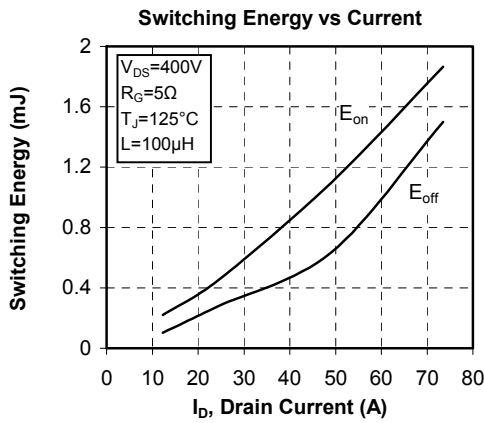
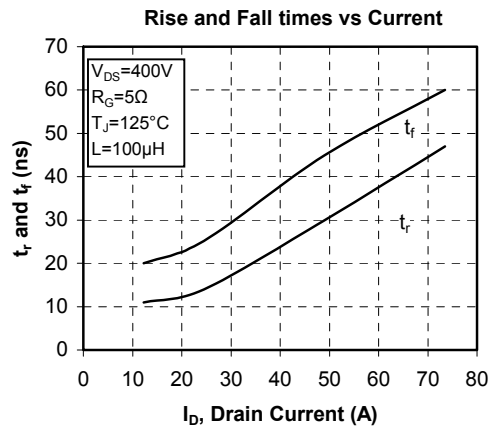
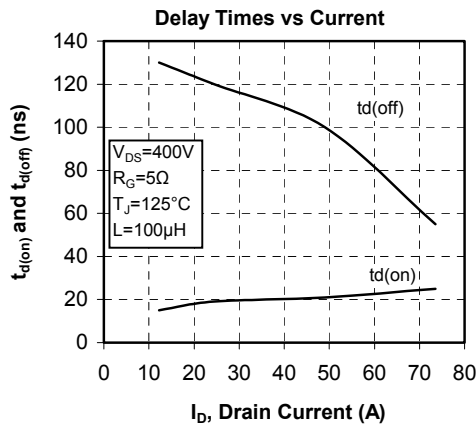
**SP1 Package outline** (dimensions in mm)


See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

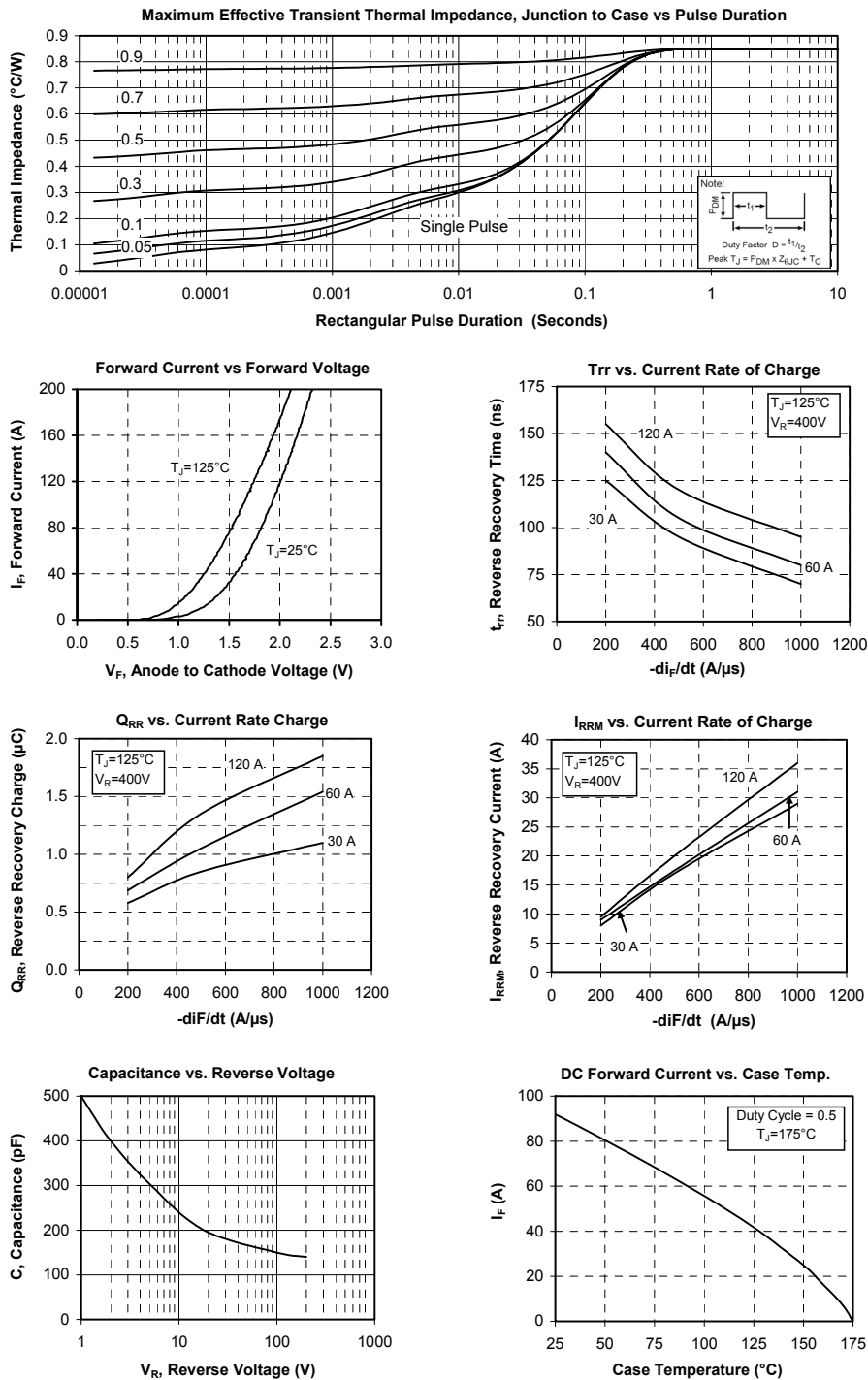
## Typical CoolMOS Performance Curve







## Typical chopper diode Performance Curve



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